

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (Currently Amended): A semiconductor device, comprising:
an insulating substrate having a surface on which a first SiO₂ film is formed;
a single-crystal silicon thin film having bonded thereto a second SiO₂ film, which single-crystal silicon thin film is bonded with the insulating substrate on a partial region of the insulating substrate via the first and second SiO₂ films; and
a non-single-crystal silicon thin film comprising an active area of a transistor and formed on the insulating substrate in a region where the single-crystal silicon thin film is not bonded with the insulating substrate, which non-single-crystal silicon thin film is formed on the insulating substrate via the first SiO₂ film and a third SiO₂ film,
wherein the second SiO₂ film and the third SiO₂ film are of different thicknesses.

Claim 2 (Canceled).

Claim 3 (Previously Presented): The semiconductor device as defined in claim 1, wherein the single-crystal silicon thin film has a thickness of not more than about 70nm.

Claim 4 (Previously Presented): The semiconductor device as defined in claim 1, wherein the single-crystal silicon thin film has a thickness of not more than about 20nm.

Claim 5 (Previously Presented): The semiconductor device as defined in claim 1, wherein the non-single-crystal silicon thin film comprises polycrystalline silicon.

Claim 6 (Withdrawn): The semiconductor device as defined in claim 1, wherein the non-single-crystal silicon thin film comprises continuous grain silicon.

Claim 7 (Withdrawn): The semiconductor device as defined in claim 1, wherein the non-single-crystal silicon thin film comprises amorphous silicon.

Claim 8 (Withdrawn): The semiconductor device as defined in claim 7, wherein a non-single crystal silicon thin-film transistor, which includes a gate insulating film made up of at least one insulating film including silicon nitride, is formed using the amorphous silicon thin film.

Claim 9 (Currently Amended): A ~~The~~ semiconductor device as defined in claim 1, comprising:

an insulating substrate having a surface on which a first SiO₂ film is formed;
a single-crystal silicon thin film having bonded thereto a second SiO₂ film, which single-crystal silicon thin film is bonded with the insulating substrate on a partial region of the insulating substrate via the first and second SiO₂ films; and

a non-single-crystal silicon thin film formed on the insulating substrate in a region where the single-crystal silicon thin film is not bonded with the insulating substrate, which non-single-crystal silicon thin film is formed on the insulating substrate via the first SiO₂ film and a third SiO₂ film,

wherein the second SiO₂ film and the third SiO₂ film are of different thicknesses, and
wherein a transistor formed using the single-crystal silicon thin film is arranged such that, from an insulating substrate side, a gate electrode, a gate insulating film, and the single-crystal silicon thin film are formed in this order.

Claim 10 (Previously Presented): The semiconductor device as defined in claim 9, wherein at least a part of the transistor formed using the single-crystal silicon thin film includes an interlayer insulating film and metal interconnects provided further on the single-crystal silicon thin film.

Claim 11 (Withdrawn): The semiconductor device as defined in claim 9, wherein the transistor formed using the single-crystal silicon thin film is arranged such that, from an insulating substrate side, an interlayer insulating film, a metal interconnects layer, an interlayer insulating film, a gate electrode, a gate insulating film, and the single-crystal silicon thin film are formed in this order, and in at least a part of the transistor, an interlayer insulating film and metal interconnects are further provided on the single-crystal silicon thin film.

Claim 12 (Previously Presented): The semiconductor device as defined in claim 1, wherein the insulating substrate comprises a high strain point glass including an alkaline-earth alumino-borosilicate glass.

Claim 13 (Previously Presented): The semiconductor device as defined in claim 1, wherein the insulating substrate comprises any one of a barium borosilicate glass, a barium alumino-borosilicate glass, an alkaline-earth alumino-borosilicate glass, a borosilicate glass, an alkaline-earth-zinc-lead-alumino-borosilicate glass, and an alkaline-earth-lead-alumino-borosilicate glass.

Claim 14 (Previously Presented): The semiconductor device as defined in claim 1, wherein a difference of linear expansion between the insulating substrate and the single-crystal silicon thin film is about not more than 250ppm at temperatures in a range between substantially room temperature and 600°C.

Claim 15 (Previously Presented): The semiconductor device as defined in claim 1, wherein the insulating substrate comprises a high strain point glass whose strain point is not less than 500°C.

Claims 16 (Canceled).

Claim 17 (Withdrawn): A semiconductor device, comprising:
an insulating substrate having a surface on which an SiO₂ film is formed; and
a single-crystal silicon substrate bonded with the insulating substrate,
wherein, the single-crystal silicon substrate includes a porous silicon layer and a single-crystal silicon thin film formed on the porous silicon layer and has a surface which is on a single-crystal silicon thin film side with respect to the porous silicon layer and on which an SiO₂ film is formed,
the surface of the insulating substrate, where the SiO₂ film is formed, is bonded with the surface of the single-crystal silicon substrate, where the SiO₂ film is formed, and
a part of the single-crystal silicon substrate is separated at the porous silicon layer, and the porous silicon layer is removed from a remaining part of the single-crystal silicon substrate, the remaining part still being on the insulating substrate after the part is separated.

Claim 18 (Withdrawn): The semiconductor device as defined in claim 17, wherein, in different regions on the insulating substrate, the single-crystal silicon thin film and a non-single-crystal silicon thin film are formed.

Claim 19 (Withdrawn): The semiconductor device as defined in claim 17, wherein the single-crystal silicon thin film is not more than about 70nm thick.

Claim 20 (Withdrawn): The semiconductor device as defined in claim 17, wherein the single-crystal silicon thin film is not more than about 20nm thick.

Claim 21 (Withdrawn): The semiconductor device as defined in claim 18, wherein the non-single-crystal silicon thin film comprises polycrystalline silicon.

Claim 22 (Withdrawn): The semiconductor device as defined in claim 18, wherein the non-single-crystal silicon thin film comprises continuous grain silicon.

Claim 23 (Withdrawn): The semiconductor device as defined in claim 18, wherein the non-single-crystal silicon thin film comprises amorphous silicon.

Claim 24 (Withdrawn): The semiconductor device as defined in claim 23, wherein a non-single crystal silicon thin-film transistor, which includes a gate insulating film comprising at least one insulating film including silicon nitride, is formed using the amorphous silicon thin film.

Claim 25 (Withdrawn): The semiconductor device as defined in claim 17, wherein a transistor formed using the single-crystal silicon thin film is arranged such that, from an insulating substrate side, a gate electrode, a gate insulating film, and the single-crystal silicon thin film are formed in this order.

Claim 26 (Withdrawn): The semiconductor device as defined in claim 25, wherein at least a part of the transistor formed using the single-crystal silicon thin film includes an interlayer insulating film and a metal interconnects layer provided further on the single-crystal silicon thin film.

Claim 27 (Withdrawn): The semiconductor device as defined in claim 17, wherein the transistor formed using the single-crystal silicon thin film is arranged such that, from an insulating substrate side, an interlayer insulating film, a metal interconnects layer, an interlayer insulating film, a gate electrode, a gate insulating film, and the single-crystal silicon thin film are formed in this order, and in at least a part of the transistor, an interlayer insulating film and metal interconnects are further provided on the single-crystal silicon thin film.

Claim 28 (Withdrawn): The semiconductor device as defined in claim 17, wherein the insulating substrate comprises a high strain point glass including an alkaline-earth alumino-borosilicate glass.

Claim 29 (Withdrawn): The semiconductor device as defined in claim 17, wherein the insulating substrate comprises any one of a barium borosilicate glass, a barium alumino-borosilicate glass, an alkaline-earth alumino-borosilicate glass, a borosilicate glass, an alkaline-earth-zinc-lead-alumino-borosilicate glass, and an alkaline-earth-lead-alumino-borosilicate glass.

Claim 30 (Withdrawn): The semiconductor device as defined in claim 17, wherein a difference of linear expansion between the insulating substrate and the single-crystal silicon substrate is about not more than 250ppm at temperatures in a range between substantially room temperatures and 600°C.

Claim 31 (Withdrawn): The semiconductor device as defined in claim 17, wherein the insulating substrate comprises a high strain point glass whose strain point is not less than 500°C.

Claim 32 (Withdrawn): The semiconductor device as defined in claim 17, wherein on a substantially entire surface of the insulating substrate, the single-crystal silicon thin film is formed.

Claims 33-42 (Canceled).

Claim 43 (Withdrawn): A semiconductor structure comprising:
an insulating substrate having a surface on which a first SiO₂ film is formed; and
a single-crystal silicon substrate bonded with the insulating substrate, wherein
the single-crystal silicon substrate includes a buried oxide layer, a hydrogen ion
implantation section in which a distribution of hydrogen ions peaks in the buried oxide layer, and

a single-crystal silicon thin film formed on the buried oxide layer, the single-crystal silicon substrate having a surface which is on a single-crystal silicon thin film side with respect to the buried oxide layer and on which a second SiO₂ film is formed, and

the surface of the insulating substrate on which the first SiO₂ film is formed is bonded with the surface of the single-crystal silicon substrate on which the second SiO₂ film is formed.

Claim 44 (Withdrawn): The semiconductor structure as defined in claim 43, wherein the single-crystal silicon substrate is bonded to only a portion of the surface of the insulating substrate on which the first SiO₂ film is formed.

Claim 45 (Withdrawn): The semiconductor structure as defined in claim 43, wherein the single-crystal silicon thin film has a thickness of not more than about 70nm.

Claim 46 (Withdrawn): The semiconductor structure as defined in claim 43, wherein the single-crystal silicon thin film has a thickness of not more than about 20nm.

Claim 47 (Withdrawn): The semiconductor structure as defined in claim 43, wherein the insulating substrate comprises a high strain point glass including an alkaline-earth alumino-borosilicate glass.

Claim 48 (Withdrawn): The semiconductor structure as defined in claim 43, wherein the insulating substrate comprises any one of a barium borosilicate glass, a barium alumino-borosilicate glass, an alkaline-earth alumino-borosilicate glass, a borosilicate glass, an alkaline-earth-zinc-lead-alumino-borosilicate glass, and an alkaline-earth-lead-alumino-borosilicate glass.

Claim 49 (Withdrawn): The semiconductor structure as defined in claim 43, wherein a difference of linear expansion between the insulating substrate and the single-crystal silicon substrate is about not more than 250ppm at temperatures in a range between substantially room temperatures and 600°C.

Claim 50 (Withdrawn): The semiconductor structure as defined in claim 43, wherein the insulating substrate comprises a high strain point glass whose strain point is not less than 500°C.

Claim 51 (Currently Amended): A semiconductor device, comprising:
an insulating substrate having a surface on which a first SiO₂ film is formed;
a single-crystal silicon thin film having bonded thereto a second SiO₂ film, which single-crystal silicon thin film is bonded to the insulating substrate via the first and second SiO₂ films, the single-crystal silicon thin film having a substantially uniform thickness and a substantially damage-free surface; and
a non-single-crystal silicon thin film comprising an active area of a transistor and formed on the insulating substrate in a region where the single-crystal silicon thin film is not bonded with the insulating substrate, which non-single-crystal silicon thin film is formed on the insulating substrate via the first SiO₂ film and a third SiO₂ film,
wherein
the second SiO₂ film and the third SiO₂ film are of different thicknesses.

Claim 52 (Previously Presented): The semiconductor device as defined in claim 51, further comprising:
transistor elements formed from the single-crystal silicon thin film.

Claim 53 (Currently Amended): A ~~The semiconductor device as defined in claim 52,~~
comprising:
an insulating substrate having a surface on which a first SiO₂ film is formed;
a single-crystal silicon thin film having bonded thereto a second SiO₂ film, which single-crystal silicon thin film is bonded to the insulating substrate via the first and second SiO₂ films,
the single-crystal silicon thin film having a substantially uniform thickness and a substantially damage-free surface;

a non-single-crystal silicon thin film formed on the insulating substrate in a region where the single-crystal silicon thin film is not bonded with the insulating substrate, which non-single-crystal silicon thin film is formed on the insulating substrate via the first SiO₂ film and a third SiO₂ film; and

transistor elements formed from the single-crystal silicon thin film,

wherein the second SiO₂ film and the third SiO₂ film are of different thicknesses, and

wherein the transistor elements are arranged such that, from an insulating substrate side, a gate electrode, a gate insulating film, and the single-crystal silicon thin film are formed in this order.

Claim 54 (Previously Presented): A semiconductor device, comprising:
an insulating substrate having a surface on which a first SiO₂ film is formed; and
a single-crystal silicon thin film bonded with the insulating substrate on a partial region of the insulating substrate,

wherein the single-crystal silicon thin film has a substantially uniform thickness and has a surface substantially free of damage,

the single-crystal silicon thin film has bonded thereto a second SiO₂ film,

the surface of the insulating substrate, where the first SiO₂ film is formed, is bonded with the single-crystal silicon thin film, where the second SiO₂ film is formed, and

a transistor formed using the single-crystal silicon thin film is arranged such that, from an insulating substrate side, a gate electrode, a gate insulating film, and the single-crystal silicon thin film are formed in this order.

Claim 55 (Previously Presented): A semiconductor device, comprising:
an insulating substrate having a surface on which a first SiO₂ film is formed;
a single-crystal silicon thin film bonded to the insulating substrate, the single-crystal silicon thin film having a substantially uniform thickness and a substantially damage-free surface; and

transistor elements formed from the single-crystal silicon thin film,

wherein

the single-crystal silicon thin film has bonded thereto a second SiO₂ film,
the surface of the insulating substrate on which the first SiO₂ film is formed is bonded with the second SiO₂ film thereby bonding the single-crystal silicon thin film to the insulating substrate,

the bonded single-crystal silicon thin film is disposed on only part of the insulating substrate on which the first SiO₂ film is formed, and

the transistor elements are arranged such that, from an insulating substrate side, a gate electrode, a gate insulating film, and the single-crystal silicon thin film are formed in this order.

Claim 56 (New): The semiconductor device as defined in claim 1, wherein the second SiO₂ film is substantially provided only in an area covered by the single-crystal silicon thin film.

Claim 57 (New): The semiconductor device as defined in claim 1, wherein an area of the insulating substrate covered by the single-crystal silicon thin film is essentially the same as an area of the insulating substrate covered by the second SiO₂ film.

Claim 58 (New): The semiconductor device as claimed in claim 1, wherein the non-single-crystal silicon thin film is not formed on the insulating substrate via the second SiO₂ film.

Claim 59 (New): The semiconductor device as claimed in claim 1, wherein the second SiO₂ film is provided in an area corresponding to an area of the single-crystal silicon thin film.

Claim 60 (New): The semiconductor device as defined in claim 51, wherein the second SiO₂ film is substantially provided only in an area covered by the single-crystal silicon thin film.

Claim 61 (New): The semiconductor device as defined in claim 51, wherein an area of the insulating substrate covered by the single-crystal silicon thin film is essentially the same as an area of the insulating substrate covered by the second SiO₂ film.

Claim 62 (New): The semiconductor device as claimed in claim 51, wherein the non-single-crystal silicon thin film is not formed on the insulating substrate via the second SiO₂ film.

Claim 63 (New): The semiconductor device as claimed in claim 51, wherein the second SiO₂ film is provided in an area corresponding to an area of the single-crystal silicon thin film.